

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the matter of

Amendment of Part 27 of the Commission's
Rules to Govern the Operation of Wireless
Communications Services in the 2.3 GHz Band

Establishment of Rules and Policies for the
Digital Audio Radio Satellite Service in the
2310-2360 MHz Frequency Band

WT Docket No. 07-293

IB Docket No. 95-91
GEN Docket No. 90-357
RM-8610

**REPLY TO OPPOSITIONS OF SIRIUS XM RADIO INC., AEROSPACE AND FLIGHT
TEST RADIO COORDINATING COUNCIL, AND THE BOEING COMPANY TO THE
PETITION FOR PARTIAL RECONSIDERATION OF AT&T INC.**

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November 1, 2010

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In their oppositions, Sirius XM Radio Inc.,¹ Aerospace and Flight Test Radio Coordinating Council ("AFTRCC"),² and The Boeing Company ("Boeing")³ (collectively, "Opponents") fail to refute – and in some cases endorse – the arguments AT&T Inc. ("AT&T") has made in its Petition for Partial Reconsideration⁴ of the *Report and Order* in this proceeding.⁵ AT&T argued that the Wireless Communications Service ("WCS") performance requirements the Commission adopted lack support in the record and cannot be satisfied. All parties addressing the question agree that the requirements should be modified to allow licensees to

¹ Opp'n of Sirius XM Radio Inc. to Pets. for Recons. of the WCS Coalition and AT&T Inc. (filed Oct. 18, 2010) ("Sirius XM Opp'n").

² Opp'n of AFTRCC to Pets. for Recons. (filed Oct. 18, 2010) ("AFTRCC Opp'n").

³ Opp'n of the Boeing Company (filed Oct. 18, 2010) ("Boeing Opp'n").

⁴ Pet. of AT&T Inc. for Partial Recons. (filed Sept. 1, 2010) ("AT&T Pet.").

⁵ *Amendment of Part 27 of the Comm'n's Rules to Govern the Operation of Wireless Comm's Servs. in the 2.3 GHz Band*, WT Dkt No. 07-293, Report and Order and Second Report and Order, FCC 10-82 (rel. May 20, 2010); *Erratum* (rel. June 8, 2010); *Second Erratum* (rel. July 14, 2010) (collectively, "*Report and Order*").

deploy the most useful and efficient networks possible. AT&T also argued that various technical rules – the power spectral density (“PSD”) limit, the restrictive duty cycles, the spectral segregation of FDD base and mobile stations, and the ban on low-power outdoor antennas – are unjustified by the record, will relegate WCS to second-class status as a broadband service, and will deter buildout. While the parties disagree on the details, all *do* agree that the technical rules need to be changed. Accordingly, as explained in the AT&T Petition and below, the Commission should reconsider portions of the *Report and Order*.⁶

I. The Parties Agree That the WCS Performance Requirements Must Be Extended

No party disputes that the WCS performance requirements should be extended to allow licensees sufficient time to build out.⁷ The deadlines the Commission adopted have no basis in the record.⁸ Moreover, they will not accommodate the use of LTE, the 4G technology selected by most wireless providers and one that is less likely to interfere with SDARS than WiMAX.⁹ Due to the time it will take for WCS Band LTE equipment to be standardized, developed, produced, and deployed, the Commission should require coverage of 40% of the population by the end of the current license term in 2017 and 75% by July 2020.¹⁰ No party challenges

⁶ AT&T submits this Reply pursuant to Section 1.429(g) of the Commission’s rules. 47 C.F.R. § 1.429(g). As Opponents each served AT&T by first-class mail, this Reply is timely. *See id.* § 1.4(h) (allowing three more days to respond when served by mail).

AT&T fully endorses the WCS Coalition’s replies to Opponents’ oppositions.

⁷ Sirius XM Opp’n at 20-21 (supporting the extension request); Opp’n of the WCS Coalition to Pet. for Recons. of Green Flag, et al. at 2-3 (filed Oct. 18, 2010); Pet. of the WCS Coalition for Partial Recons. at 1-6 (filed Sept. 1, 2010) (“WCS Coalition Pet.”); Pet. of Green Flag Wireless, LLC; CWC License Holding, Inc.; and James McCotter for Recons. at 1-7 (filed Sept. 1, 2010) (“Green Flag, et al. Pet.”); AT&T Pet. at 3-11. ARRL, Boeing, and AFTRCC did not address this issue.

⁸ AT&T Pet. at 3-6.

⁹ *Id.* at 6-8.

¹⁰ *Id.* at 8-10. AT&T explained that its projected date of completion of the 40% buildout is

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AT&T's projections. Likewise, no party disputes that the new technical rules so cripple the C and D Blocks that any performance requirement more stringent than a traditional "substantial service" requirement effectively will preclude the use of that spectrum.¹¹ Finally, all parties that have addressed the issue still agree that a "keep what you use" approach will promote the Commission's buildout goals while the "death penalty" will subvert them.¹²

II. The Technical Rules Must Be Changed to Permit Viable Broadband Service

All parties agree that the technical rules adopted by the Commission are unworkable, albeit from different perspectives. While Opponents challenge AT&T's requests for modifications to these rules, they make little – if any – effort to disprove AT&T's technical arguments that its proposals will not increase the risk of harmful interference; instead, they just blithely assert their claims. Nor do they contest AT&T's showing that its proposals are needed for WCS licensees to provide the broadband services the Commission desires. Opponents ignore the key fact that, in order to allow sharing of the 2.3 GHz band, the Commission must balance the needs of all licensees, and none can enjoy the level of interference-free operation they seek.

A. The Record Does Not Support Placing PSD Limits on WCS Transmitters

The 50 mW per MHz PSD limit for mobile devices will have a devastating impact on the usability of WCS spectrum. Sirius XM does not dispute this in its opposition. It ignores AT&T's showings that the PSD limit will require up to four times as many cell sites (for adequate voice service on an LTE network) and will reduce the network's quality, throughput,

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June 2017, a month before the end of the license term, and recommended that the deadline be synchronized with the end of the term. *Id.* at 10. AT&T inadvertently did not also suggest that the 75% buildout deadline be synchronized with the anniversary of the term – July instead of June 2020. The WCS Coalition correctly did so. *See* WCS Coalition Pet. at 2.

¹¹ *See* AT&T Pet. at 21-22; WCS Coalition Pet. at 2-4.

¹² *See* WCS Coalition Pet. at 4-6; Green Flag, et al. Pet. at 5-7; AT&T Pet. at 11-13.

and efficiency.¹³ Nor can Sirius XM dispute that the PSD limit will make mobile broadband uneconomical for both existing carriers and new entrants and that it will require further lengthening the performance requirements.¹⁴

Instead, Sirius XM takes past filings out of context to assert that the WCS licensees suggested the PSD limit in the first place.¹⁵ Although the WCS Coalition acceded to PSD limits for mobile devices, it did so only for the C and D Blocks.¹⁶ No party previously suggested that a PSD limit be applied to the A and B Blocks.¹⁷ Moreover, when the WCS Coalition agreed to PSD limits for the C and D Blocks, it assumed there would be no guard band separating mobile device transmissions from the SDARS spectrum.¹⁸ However, the Commission effectively created guard bands when it barred mobile services from half of the C and D Blocks. Nothing in the record suggests that the PSD limit is needed to protect SDARS users under these conditions.

In any event, Sirius XM's real concern seems to be that WCS licensees not aggregate power when they aggregate spectrum blocks.¹⁹ However, the technical rules do not allow WCS licensees to aggregate power as Sirius XM envisions. The rules put a per-Block power limit of 250 mW on mobile transmitters and 20 W on fixed CPE.²⁰ Thus, while licensees may aggregate

¹³ See AT&T Pet. at 15-16.

¹⁴ See *id.* at 15.

¹⁵ Sirius XM Opp'n at 12-14.

¹⁶ Notice of Oral *Ex Parte* Notice of WCS Coalition, Attach. at 14 (filed Aug. 19, 2009) ("Aug. 19, 2009 WCS Coalition *Ex Parte* Attachment").

¹⁷ Even now, Sirius XM discusses only the C and D Blocks. Sirius XM Opp'n at 13 ("Applying this technique in the 2.5 MHz of the WCS C and D Blocks . . .").

¹⁸ See Aug. 19, 2009 WCS Coalition *Ex Parte* Attachment at 14.

¹⁹ See Sirius XM Opp'n at 13-14 & n.34; Pet. of Sirius XM Radio Inc. for Partial Recons. and Clarification at 9-10 (filed Sept. 1, 2010).

²⁰ 47 C.F.R. § 27.50(a)(2), (3)(i).

spectrum, they may not aggregate power. The rules simply do not permit a licensee to deploy mobile devices with power outputs of 500 mW unless they are designed to put no more than 250 mW into each 5 MHz Block. In addition, the differences in the technical rules between the A and B Blocks and the C and D Blocks preclude combining C or D with A or B Block spectrum.²¹

B. The Record Supports Increased Mobile Transmitter Duty Cycle Limits

As AT&T showed in its petition, the Commission's duty cycle limits for WCS mobile transmitters arbitrarily restrict uplink throughput more than is necessary to prevent harmful interference to SDARS. The Ashburn tests demonstrate that a mobile device operating at a 38% duty cycle has a "negligible" potential for causing harmful interference.²² Sirius XM does not seriously contest the record evidence suggesting that the 38% duty cycle can be relaxed without increasing this potential materially. Instead, Sirius XM points to a fleeting instance of interference to justify its proposed duty cycle limits.²³ The Commission rejected these arguments because they fail to "strike[] an appropriate balance between our goals of protecting SDARS receivers from harmful interference and enabling the provision of WCS mobile broadband services using different technologies."²⁴ Yet, Sirius XM offers the Commission no reason to change its mind, and no party has pointed to any flaw in AT&T's showing that the duty cycle could be raised to at least 43.333%.

1. The Ashburn Tests

Sirius XM has argued repeatedly that the "35% duty cycle" used in the Ashburn tests caused harmful interference to SDARS receivers and, in any event, cannot justify a higher duty

²¹ AT&T Pet. at 21-22; Decl. of Douglas Duet ¶ 25 (filed Sept. 1, 2010) ("Duet Decl.").

²² *Report and Order* at 31 ¶ 66, 33 ¶ 72.

²³ *See* Sirius XM Opp'n at 4-5.

²⁴ *Report and Order* at 34 ¶ 73.

cycle limit. As an initial matter, the Ashburn tests actually were conducted at a duty cycle of 37.03% according to the consensus methodology ultimately adopted by the parties and the Commission staff.²⁵ Further, these tests clearly show that WCS devices operating at a 37.03% duty cycle did not cause harmful interference to SDARS receivers. Only one instance of muting occurred, and this was in a test designed to maximize interference potential.²⁶ Such fleeting interference does *not* “seriously degrade, obstruct, or repeatedly interrupt SDARS service” and is, therefore, *not* “harmful interference.”²⁷ Consequently, the Commission concluded that, at a 37.03% duty cycle, “the potential for harmful interference is *negligible even during the worst-case situations* where a WCS mobile transmitter is operating at full power without ATPC, is transmitting during the allocated transmit sub-frame of each and every frame, and is in close proximity to an OEM or aftermarket SDARS receiver”²⁸ and made a predictive judgment that the results at 38%, a level consistent with WiMAX device standards,²⁹ will not differ materially.³⁰

²⁵ Opp’n of the WCS Coalition to Pet. of Sirius XM Radio Inc. for Partial Recons. and Clarification at 7 (filed Oct. 18, 2010).

²⁶ See *Report and Order* at 30 ¶ 64.

²⁷ *Id.* at 30 ¶ 63 (emphasis added).

²⁸ *Id.* at 31 ¶ 66 (emphasis added).

²⁹ *Report and Order* at 33 ¶ 70 & n.185.

³⁰ Sirius XM also points to a report submitted by the WCS Coalition that, in Sirius XM’s view, shows that increasing the duty cycle from 6% to 43% increases by a factor of three the separation distance between a WCS transmitter and an SDARS receiver that is required to prevent harmful interference. Sirius XM Opp’n at 5 and n.8 (citing Reply Comments of the WCS Coalition, Attach. B at 20 (filed Mar. 17, 2008) (“WCS Coalition Reply Comments”)). These test results support AT&T’s proposed increase to 43.333%. Like the Ashburn tests, the test report cited by Sirius XM was a “worst case” test – it spread maximum out-of-band emissions (“OOBE”) according to the tested spectral mask across the entire SDARS spectrum, including the outer satellite, repeater, and inner satellite sub-bands; this maximum was far in excess of the OOBE a real WCS mobile transmitter operating with ATPC would generate and, therefore, more likely to cause interference than a real WCS broadband signal. Even under these adverse conditions, at a 43% duty cycle, two of the six SDARS receivers muted only at distances closer than 8 feet (2.4 meters), and the maximum distance at which muting occurred was 24 feet (7.3 meters).

2. The Record Supports AT&T's Request to Increase the WCS Mobile Transmit Duty Cycle to at Least 43.333%

In fact, as AT&T and the WCS Coalition have shown,³¹ the record contains a number of quantifiable factors that show that interference to SDARS receivers will be less than the Commission assumed in setting the duty cycle limit. This lower interference from real-world operations makes the 38% duty cycle excessively conservative and justifies increasing the duty cycle limit to at least 43.333%, which is the nearest TD-LTE configuration.³² For instance, ATPC will cause WCS mobile devices to operate at least 3 dB below the maximum authorized power at least 99% of the time.³³ Also, the peak-to-average power ratio ("PAPR") of LTE mobile devices, which likely will be used by WCS licensees offering mobile service, is 2-2.5 dB lower than the PAPR of WiMAX devices operating at the same average power.³⁴ For each 1 dB from these in-band power reductions, OOB E will go down by 2.5 dB.³⁵ Moreover, the FCC said that it expects future SDARS receivers to be designed to withstand interference better than the "legacy" receivers.³⁶ Because retaining the 38% duty cycle, which is not a TD-LTE

³¹ AT&T Pet. at 16-20; WCS Coalition Pet. at 7; Written *Ex Parte* Presentation of the WCS Coalition at 2 (filed May 12, 2010); *see generally* Written *Ex Parte* Presentation of Alcatel-Lucent at 3-4 (filed May 13, 2010) (explaining the harm to LTE from the proposed duty cycles); Comments of Ericsson Inc at 4-5 (filed Apr. 22, 2010) (same) ("Ericsson Comments").

³² Ericsson Comments at 4-5.

³³ WCS Coalition Reply Comments, Attach. C at 5; Comments of the WCS Coalition, Attach. B at 6, 19-22 (filed Feb. 14, 2008) ("WCS Coalition Comments"); *see also Report and Order* at 23 ¶ 49.

³⁴ AT&T Pet. at 7-8; Duet Decl. ¶ 4.

³⁵ WCS Coalition Reply Comments, Attach. C at 5; WCS Coalition Comments, Attach. B at 11, 19-22.

³⁶ *Report and Order* at 36-37 ¶ 82 ("[W]e expect Sirius XM to adjust to the changed RF environment in the 2.3 GHz band" and for future deployments of SDARS receivers "to exhibit state-of-the-art filtering sufficiently adequate to accommodate . . . future adjacent-band WCS mobile stations' operations.").

configuration, would require WCS licensees using LTE to offer subscribers substantially reduced uplink capacity, and increasing the duty cycle to 43.333% would not cause harmful interference to SDARS receivers, the Commission should allow a mobile duty cycle of at least 43.333%.³⁷

C. Licensees Should Have the Flexibility to Deploy FDD Mobile and Portable Devices in the WCS Upper Blocks and Base Stations in the Lower Blocks

AFTRCC and Boeing argue that FDD mobile and portable devices³⁸ must be banned from the upper WCS Blocks (2345-2360 MHz) to protect the aeronautical mobile telemetry (“AMT”) service from interference. Yet, the WCS technical rules allow TDD mobile devices to operate in the upper Blocks, and FDD mobile devices will not interfere with AMT to any greater degree than TDD devices.³⁹ AFTRCC and Boeing do not disagree, and they have not shown they will be significantly harmed by TDD mobiles in the upper Blocks under the current rules. Instead, their argument reduces to their hope that WCS licensees will migrate to FDD-LTE and eliminate whatever minor difficulties the AMT industry will face under the adopted OOB limits.⁴⁰ Events may or may not unfold as AFTRCC and Boeing predict, but crystal-ball gazing distracts from the key point: the WCS technical rules for mobile transmitters adequately protect AMT from WCS mobile operations in the upper Blocks. Because TDD mobile operations in the upper Blocks are inescapable, and FDD mobile transmitters have no more interference potential than TDD transmitters, there is simply no basis to restrict FDD mobile devices to the lower WCS Blocks and preclude WCS licensees from pairing WCS spectrum with other bands.

³⁷ In its petition, AT&T showed there is no rational basis for a lower, 25%, duty cycle limit for FDD devices than for TDD devices. AT&T Pet. at 18-20. No party disputes this showing. Thus, the Commission should raise the FDD duty cycle limit to match the one for TDD.

³⁸ For convenience, we will simply say “mobile.”

³⁹ AT&T Pet. at 20-21; WCS Coalition Pet. at 7 & n.17.

⁴⁰ See AFTRCC Opp’n at 8-9; Boeing Opp’n at 8-9.

D. The Record Supports Allowing Low-Power Fixed CPE to Use Outdoor Antennas

Sirius XM offers no convincing argument for the Commission to retain the restriction on outdoor antennas for low-power fixed CPE. In their petitions, AT&T and the WCS Coalition demonstrated that this rule will require licensees to discontinue existing service, including fixed Internet access; will curtail the deployment of broadband service in rural, tribal, and other unserved and underserved areas; and will preclude potentially valuable uses of the crippled C and D Blocks.⁴¹ As the WCS Coalition and AT&T also showed, there is no reason to believe that low-power fixed outdoor antennas will interfere with SDARS receivers.⁴² While Sirius XM quibbles with some of these arguments, it cannot escape experience. The prior rules permitted outdoor antennas to transmit at 1000 times the power level being discussed,⁴³ and, if there were any real basis for Sirius XM's concerns, surely *some* interference would have been reported even though WCS facilities are not yet widespread. This current, real-world experience clearly is sufficient to allow WCS licensees to continue deploying low-power outdoor antennas.⁴⁴

E. The Record Does Not Support Placing PFD Limits on WCS Transmitters

Sirius XM asks the Commission to reconsider its rejection of ground-level power flux density ("PFD") limits on WCS base stations.⁴⁵ In the *Report and Order*, the Commission

⁴¹ AT&T Pet. at 23-24; WCS Coalition Pet. at 8-12. AT&T has received a waiver of this rule; however, the Mobility Division has reserved the right to terminate the waiver if the Commission does not grant AT&T's petition for reconsideration. Letter from Roger S. Noel, Chief, Mobility Div., WTB, FCC, to James J.R. Talbot, AT&T Inc., DA 10-1642 (Aug. 27, 2010).

⁴² AT&T Pet. at 23; WCS Coalition Pet. at 8-9.

⁴³ 47 C.F.R. § 27.50(a) (2009).

⁴⁴ If, however, the Commission insists on testing every possible new configuration of equipment developed for the WCS Band as Sirius XM seems to want, *see* Sirius XM Opp'n at 8-10, applications requiring low-power fixed external antennas are unlikely to emerge.

⁴⁵ *Id.* at 15.

considered three approaches to power limits for WCS base stations: (i) an average EIRP limit with a PAPR limit; (ii) a ground-level emissions limit; and (iii) a hybrid EIRP and ground-level emissions limit.⁴⁶ The Commission adopted an average EIRP limit with a PAPR limit and rejected any ground-based emissions limit. Sirius XM has advanced no new evidence or arguments for its position, which must again be rejected.⁴⁷

CONCLUSION

For the reasons discussed above, the Commission should reject Sirius XM's, AFTRCC's, and Boeing's oppositions and amend the WCS technical and performance rules as requested in the Petitions for Partial Reconsideration of AT&T and the WCS Coalition.

Respectfully submitted,

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⁴⁶ *Report and Order* at 50 ¶ 115.

⁴⁷ Sirius XM's request, expressed as "an absolute PFD limit [of] -44 dBm from the WCS A and B Blocks, and -55 dBm from the WCS C and D Blocks," Sirius XM Opp'n at 15, is meaningless. PFD is measured in units of power per area (*e.g.*, mW/cm²), not, as Sirius XM has done, in units of power (dBm, or decibels relative to 1 mW).

CERTIFICATE OF SERVICE

I hereby certify that on this first day of November, 2010, I caused true and correct copies of the foregoing Reply to Oppositions of Sirius XM Radio Inc., Aerospace and Flight Test Radio Coordinating Council, and The Boeing Company to the Petition for Partial Reconsideration of AT&T Inc. to be served by first class mail, postage prepaid, upon:

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